Frankly Speaking

The Scope of Our Profession

TRAFFIC engineering has been accused of spreading its activities to fields customarily thought of as belonging to such professions as highway engineering, motor vehicle administration, transit operation and police. This is true, to a certain extent because these and similar groups have been and are concerned with certain phases of street traffic control and safety.

Just because traffic engineering is defined as "That phase of engineering which deals with the planning and geometric design of streets, highways and abutting lands, and with traffic operations thereon as their use is related to the safe, convenient and economic transportation of persons and goods," does not mean that we consider ourselves alone in this field. As a matter of fact, the phenomenal rise in importance of the profession of traffic engineering is due in large part to the cooperation and close relationship that has been maintained with these kindred professions.

The control of street and highway traffic is such a far reaching and important problem in our civilization that no one organization can successfully cope with it alone. Success can only come through a mutual attack by all parties concerned.

Traffic engineers, however, have made a more thorough and scientific study of the behavior and capabilities of the principal elements of highway traffic than members of the other professions.

They are, therefore, better qualified to assume the leadership in this mutual attack on the traffic problem.

The splendid improvement already made in street traffic control has been largely the accomplishment of the traffic engineering profession. There will be a far greater improvement when more members of kindred professions realize the value of traffic engineering leadership.

Robert H. Mitchell

Member Board of Direction.

VOLUME XIV JUNE, 1944 NUMBER 9

Roadway and Intersection Capacity

by GUY KELCEY

EFFICIENT traffic flow on streets and highways is necessary if satisfactory transportation, which is the basic function of motor vehicles and of facilities for their accommodation, is to be provided.

In adapting existing roadways and designing new ones, to carry present or anticipated traffic loads, it is necessary to measure rates of vehicle flow, to calculate roadway capacities and to compare these measurements with acceptable standards. To provide a basis for such measurements several factors need to be considered.

The measure of traffic flow on roadways is frequently expressed in terms of total flow of vehicles, in both directions, for 12, 16, 24-hour or other periods. While such information is interesting as one means of economic measurement, it is not useful in solving specific problems of peak load traffic demands that confront transportation officials and traffic engineers in practice. Thus, a 16-hour count of 2,000 vehicles along a roadway may introduce serious problems of congestion if most of these vehicles concentrate into brief periods, in alternate directions. On the other hand, a 4,000 vehicle load on the same roadway, presents no problem of congestion if it is uniformly distributed in both directions over a 16-hour period.

Flow Characteristics

In practice, the curve of the usual traffic load fluctuates from low valleys to lofty peaks with few plateaus and often with extreme variation.

When a peak traffic load exceeds the capacity of roadway facilities for its accommodation, or of adequate facilities that are inefficiently used, it develops a false peak or "back-up" not only along the course of the heavy flow but in other directions. This "back-up" is a form of congestion that is usually characterized by inefficient movement and often requires longer to loosen up and free itself than the period of heavy peak-load that created it. Indeed, "back-up" congestion arising from an interval of heavy load often gives the impression of overload in directions where none actually exists and when the traffic load is actually normal or subnormal. If the peak-loads are accommodated, the aftermath "back-up" congestion will be avoided.

Basis for Measurement

Measurements of peak traffic loads, of rates of flow and of the capacity of roadways are necessary if a given condition is to be correctly appraised and if a satisfactory solution is to be approached.

A suitable basis for measurement of rate of vehicle movement is vehicles per lane of traffic per hour. This may also be expressed as seconds of headway per vehicle per lane.

The establishment of a practical standard of flow perfection requires an arbitrary generalization. Analogous to a tight formation of military airplanes, assume a perfect roadway, without impediments, intersections or interruptions, with ample accommodations to discharge and receive the

Guy Kelcey (Mem.) is Highway Analyst with the Port of New York Authority, and Chairman of the Institute of Traffic Engineers Nominating Committee.

flow of vehicles, perfectly trained drivers and perfect cars. Under such perfect conditions, a vehicle, per lane, each 1.2 seconds or 3,000 per lane, per hour, might possibly be attained. The author adopts this arbitrary figure as 100% against which to compare actual rates of flow, per lane, per hour, under other circumstances where various elements of perfection are lacking. Such a rate of flow is unlikely to be exceeded although it might be approached for short intervals under favorable conditions.

Impediments to Flow Efficiency

There are many impediments to the attainment of flow perfection even on open highways with all grades separated. In spite of constant improvement, drivers as a whole do not function smartly; some are slow, some are hesitant and some, who are inexpert, cannot maintain pace. Each has a different reaction time and accordingly spaces closely or well away from the next vehicle. Others fail to keep in line and occupy or block double lane space. Not all vehicles are in condition to meet the demands of excellence in their operation. Even the best roadways, with adequate lane widths, usually lack accommodations by which their full capacity per lane, per hour, may be fed onto and discharged from them without interfering with and slowing up the main flow. Again, few roadways are so well designed and maintained that maximum traffic flow is attained. Pavement defects, short curve radii and inadequate visibility or sight distances and other impedances introduced by narrow lanes, turning movements, parking, pedestrians, inadequate direction signs and other factors introduce hesitancies and turbulences that reduce traffic flow efficiency.

Back up effect from interferences to free flow of vehicles by turning movements and improper balance in use of curb or utility lane for parking and access that results in second lane loading. (Yale Bureau for Street Traffic Research photograph.)

Canvass of Experience

A canvass of highway and city traffic experience develops that a normal maximum, practical expectancy per lane, per hour, for uninterrupted flow, under favorable roadway conditions approximates 1,600 vehicles. This seems to be a practical maximum point beyond which confusions and other interferences are apt to precipitate back-ups, and serious congestions. As traffic volumes approach the practical maximum, congestion develops progressively. Various observations indicate that from ½ to 2 minutes of delay per vehicle per mile, depending on lane widths and other roadway condition and the composition of traffic, (i.e., passenger cars only or mixed passenger and commercial) are frequently experienced in uninterrupted movement when 75% of the maximum practical capacity of 1,600 vehicles per lane per hour is reached. To avoid confusion the maximum practical capacity of 1,600 vehicles per lane per hour is used in the discussion that follows. Critical capacity can be readily calculated by applying the 75% factor.

It is entirely probable that widening of roadway lanes, white lines to define them, further improvements in vehicles, better driving and better feeder and discharge facilities to and from main roadways will gradually increase this figure. Indeed, a New York City parkway count showed as high as 2,193 and, for a brief interval, Chicago Park District count records 2,043 cars per lane, per hour. In one Chicago Park District count the average per lane, per hour, for four lanes in one direction during a peak period was 1,960 or 7,840 for the four lanes. Short interval counts have been reported, but not confirmed, of 2,800 cars per lane, per hour. These maximum flows are reported to have been achieved where speeds were between 30 and 40 miles per hour.

Of far greater importance are conditions, particularly at intersections, to which the first part of this discussion is intended as an introduction.

Intersection Analysis

Intersecting flows of traffic at grade introduce the major single problem in the maintenance of good traffic flow efficiency. When the grades are separated at roadway intersections, as at clover leaf interchanges, each traffic lane is free to carry its load without interference from crossing vehicles. When, however, intersections are at grade the flow on each roadway must yield to the intersecting cross flow for intervals which vary as to length and frequency with the proportion and characteristics of the cross flow. If the number of feeder lanes on each such intersecting roadway are equal, the flow capacity of the intersection of two roadways, at grade, cannot exceed 50% of the total capacity of all feeder lanes. Similarly, at the intersection of three equal roadways, the capacity of the intersection cannot exceed one third of the total capacity of all the feeder lanes.

These maximum capacity percentages are further reduced by a number of other factors, some of which are constant and some extremely variable.

Simple interferences at intersections include those introduced by pedestrians, right and left turns and other secondary delaying factors, all of which reduce the half to third maximum, overall capacity which intersections at grade will carry. The most serious loss, however, usually develops from the necessary and frequent reversal in direction of traffic flow to accommodate crossing movements.

When the direction of flow in an intersection is reversed, to permit traffic movement in the cross direction, an interval of time must be allowed so that moving cars may clear the intersection to make way for the cross flow.

Clearance intervals normally range from 3 seconds, at intersections of relatively narrow roadways, to 5 or more seconds where roadways are wide or where the distance across the intersection is increased because the roadways intersect at an acute angle. As an example, the Chicago Park District reports that 4.76 seconds is their average clearance interval for a 66 foot roadway. At the beginning of the clearance interval, the intersection is fully in use or usable. At the end of the clearance interval, it is completely out of use and is empty of traffic. In terms, then, of intersection capacity to carry the vehicle load, half of the clearance interval is lost time.

A second loss of capacity occurs when, at the end of the clearance interval, cars, that have been stopped in the cross direction, start up. If these cars start instantly, they normally require at least the time of a full clearance interval to refill the intersection. At the beginning of this time the intersection is empty and at the end it is fully in use. Half of this interval is, then, also lost.

Thus, for each reversal of traffic flow, an amount of time equal to at least a full clearance interval is lost to the movement of traffic in clearing and refilling the intersection. Since there are two and sometimes three clearance intervals at an intersection, during each cycle, from movement in one direction back to movement in the same direction again, and since the time of one clearance interval is definitely lost during each reversal, the total of two clearance intervals is lost to the free flow of traffic, per cycle, at the intersection of two roadways and three clearance intervals are lost per cycle during a three interval movement or cycle of operation.

Another variable loss arises from "inertia lag" or delay in getting started. Thus, in starting on a green signal, stopped cars often "accordian" out so that, in extreme cases, before the last car in a line can move, the signal ahead changes to red, front cars stop, rear cars close up, some ground is gained and the process repeats. With efficient drivers, this inertia lag is reduced but is always a considerable and unavoidable loss to intersection capacity.

The total time lost per cycle, therefore, from movement in one direction back to movement again in that direction, arising from reversal of traffic flow equals the clearance intervals plus the lost time after each reversal due to inertia lag in starting.

Approximations

Assume a simple, right angled, intersection at which the normal traffic flow is in the ratio of 60% on the main and 40% on the cross roadway. The generally accepted, practical maximum of traffic flow to be expected per lane per hour, when there are no interruptions and impedances is 1,600 vehicles per lane, per hour.

Assume that a 3 second intermediate or change interval is allowed during each reversal of direction of intersecting traffic flow. Then two reversals or 6 seconds are lost per cycle. This equals 10% of a 60 second cycle time. An equal amount of time is lost due to an inertia lag in starting. The total loss is, therefore, 20% of the cycle time. The maximum time available for actual traffic movement in both directions is then 100% less 20%, or 80%. If 60% of this time is allocated to vehicles in the direction of heavy traffic then the maximum actual time available to movement in this direction is 48%. Applying this percentage to 1,600 cars per lane per hour that is taken as the practical maximum under nearly perfect conditions, the result is 768 cars, per lane per hour, as the maximum that can be expected in the heavy flow direction where the traffic loading is in the ratio of 60% in the main flow, 40% in the cross flow and a 60 second cycle of operation is used.

Calculations by this method yield the following results:

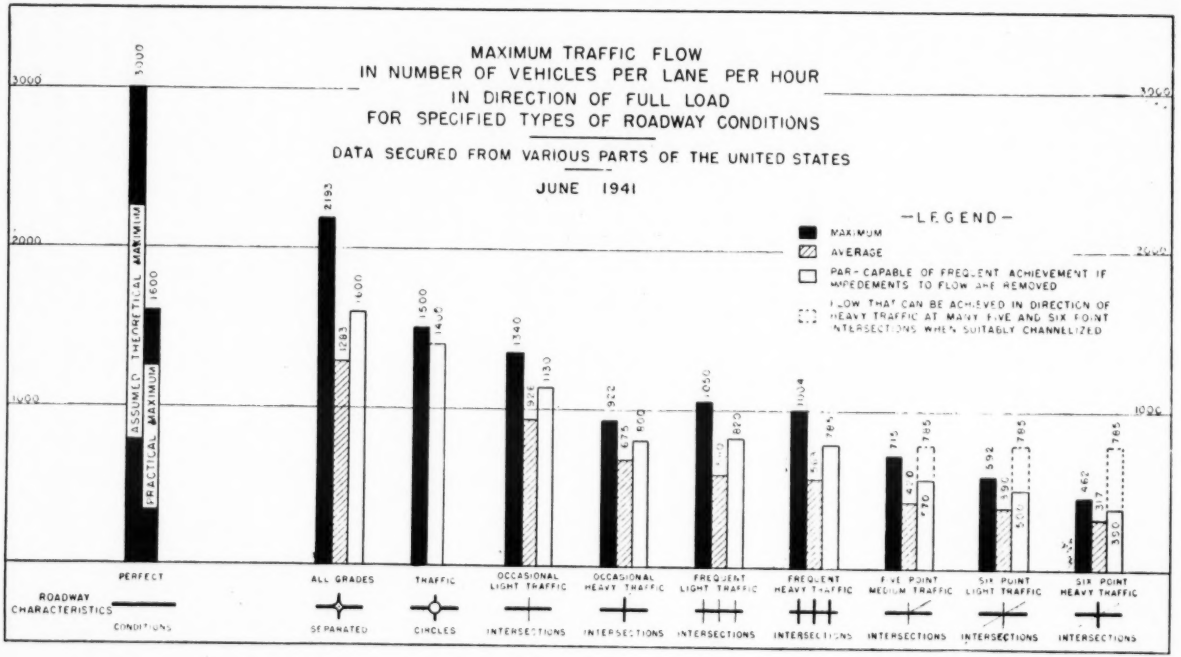
CAPACITY—INTERSECTION OF TWO ROADWAYS

60 Sec. Two-Phase Signal Cycle.

Percentage of total time given to		Maximum Practical Capacity* Vehicles Per Lane, Per Hr.	
Main St.	Cross St.	Main St.	Cross St.
50%	50%	640	640
55%	45%	704	576
60%	40%	768	512
65%	35%	832	448
70%	30%	896	384

*Critical capacity at which from ½ to 2 minutes delay per vehicle per mile, according to composition of traffic and roadway conditions is frequently experienced is approximately 75% of Maximum Practical Capacity.

Similarly at the intersection of three roadways, the maximum practical capacity can be calculated. Assume such an intersection with traffic distributed equally so that each flow of traffic is allotted one third of the time available for movement. Since approximately 30% of the total time is lost


MAXIMUM TRAFFIC FLOW
IN NUMBER OF VEHICLES PER LANE PER HOUR
IN DIRECTION OF FULL LOAD
FOR SPECIFIED TYPES OF ROADWAY CONDITIONS
DATA SECURED FROM VARIOUS PARTS OF THE UNITED STATES
JUNE 1941
-LEGEND-
MAXIMUM
AVERAGE
PAR-CAPABLE OF FREQUENT ACHIEVEMENT IF IMPEDEMENTS TO FLOW ARE REMOVED
FLOW THAT CAN BE ACHIEVED IN DIRECTION OF HEAVY TRAFFIC AT MANY FIVE AND SIX POINT INTERSECTIONS WHEN SUITABLY CHANNELIZED
2000
1000
ASSUMED THEORETICAL MAXIMUM
PRACTICAL MAXIMUM
3300
1600
2193
1283
600
1500
1400
1340
1128
1130
922
675
800
1050
870
1004
785
715
410
785
592
592
785
462
317
350
785
ROADWAY CHARACTERISTICS
CONDITIONS
PERFECT
ALL GRADES SEPARATED
TRAFFIC CIRCLES
OCCASIONAL LIGHT TRAFFIC INTERSECTIONS
OCCASIONAL HEAVY TRAFFIC INTERSECTIONS
FREQUENT LIGHT TRAFFIC INTERSECTIONS
FREQUENT HEAVY TRAFFIC INTERSECTIONS
FIVE POINT MEDIUM TRAFFIC INTERSECTIONS
SIX POINT LIGHT TRAFFIC INTERSECTIONS
SIX POINT HEAVY TRAFFIC INTERSECTIONS

in reversals leaving 70% for total useful movement, each direction would be given 23⅓% of the total cycle time. Applying this percentage to the 1,600 maximum practical expectancy of flow per lane per hour, the result is 373 vehicles per lane per hour maximum in each direction.

CAPACITY—THREE ROADWAY INTERSECTION

60 Sec. Three-Phase Signal Cycle.

Percentage of total time given to			Max. Practical Capacity* Vehicles Per Lane, Per Hr.		
St. #1	St. #2	St. #3	St. #1	St. #2	St. #3
33 1/3%	33 1/3%	33 1/3%	373	373	373
40%	30%	30%	448	336	336
40%	35%	25%	448	392	280
40%	40%	20%	448	448	224
50%	25%	25%	560	280	280
50%	30%	20%	560	336	224
60%	20%	20%	672	224	224

These rates of flow represent the practical maximum obtainable where impedances introduced by left turns, pedestrians, improper driving and other factors have been eliminated. These figures may therefore be taken as a goal to be hoped for as impedances are eliminated. As an example of such impedances, the Chicago Park District reports that, with 8½ foot lanes, average speeds of 15 m.p.h. an uninterrupted flow of 200 cars per lane per hour is attained. For 11 and 12 foot lanes with no interferences, their maximum working figure is 1,600 cars per lane per hour. Thus, the restraint introduced by too little leeway, with 8½ foot lanes reduces the flow of traffic, per lane, per hour by 900 vehicles.

To check these deductions, it was concluded to canvass and to record actual peak flow per lane, per hour, under various circumstances. Accordingly traffic engineers in all parts of the country were canvassed to determine flow, per lane, per hour, under peak load pressure for a range of traffic conditions. The results of this survey are given in the accompanying chart.

Referring to the chart, solid bars represent maximum flow reported per lane, per hour, in heavy flow direction for the conditions indicated. The shaded bars show the average of reports received.

It is suggested that traffic officials might reasonably hope to exceed the average even though they cannot always hope to attain the maximum shown on the chart. Just as a golfer's par represents a goal less than perfection but still difficult to attain, so we may reasonably take, as par, Flow values approximately half way between the maximums reported and the average of all reports. Such a par is represented by the bars marked "Par" on the chart.

Perfection of flow, on a perfect road, under perfect conditions, represented by the first solid bar, is assumed to be 3,000 cars per lane per hour.

Straight Road, All Grades Separated

Two unconfirmed, 5 minute count, reports of 2,800 vehicles per lane, per hour, were rejected. A report of 2,193 per lane, per hour, on a New York City parkway, and a high short interval, count of 2,043 vehicles per hour secured from the Chicago Park District, were the highest authentic counts reported. The average of all reports received for this condition was 1,283 cars per lane, per hour.

Traffic Circles

Few counts were available for traffic circle volumes. However, information from the New Jersey Highway Department, which has many traffic circles of various sizes, indicates that 1,500 cars per lane, per hour, or a total of 3,000 cars per hour past any point in the circle, with two or more full lanes of roadway width, is an attainable maximum. This would indicate that the maximum capacity of a

traffic circle would be about 6,000 cars per hour where traffic flow around the circle is equal from and to all entrances and exits.

Conclusions:

It is obvious, of course, that if all cross flow is cut off at an intersection, and if all impedances are removed the main flow could approach and under some conditions might exceed the 1,600 cars per lane per hour, normal maximum expectancy. The lesser figures recorded are chargeable principally to cross flow and other interferences.

Taking the approximate percentages presented earlier in this article, and ignoring secondary interferences, it is possible to calculate, roughly, maximum flows that may be hoped for at various types of roadway intersections under favorable flow conditions.

Having established what a roadway or an intersection should carry per lane, per hour, in loaded directions, interferences that prevent its attainment can be determined and, as far as possible, eliminated or relieved. Such steps obviously include careful balancing of signal timing and coordination of signals to produce continuous movement of platoons of cars thus to eliminate or reduce inertia lag in stopping and starting. White lines to define lanes entering and leaving intersections, facilitation of turning movements and many other similar steps are well known, but too little used, to improve flow efficiency.

It is particularly urged that many intersections of these roadways are capable of channelization treatments to eliminate irregular movements, to reduce the length of shuttling maneuvers, to simplify problems of interchange of vehicles and pedestrians, and to permit their operation on a two rather than a three interval cycle where it is necessary to use traffic signals. Five and six point intersections can often be channelized so that, by simplifying vehicle movements, main flow efficiencies, equal to those of normal intersections and indicated on the chart by dotted lines, can be attained. Indeed, many intersections of all types can be channelized to great advantage in flow efficiency and in safe operation that results from efficient use of roadway space.

While many of the remarks in this presentation are obvious, the author offers as his reason for presenting them that they are applied in practice to such a limited degree that they seem worth repeating. Certainly if the capacity of roadways and particularly of intersections can be substantially bettered by possible adjustments and inexpensive improvements, the results are the equivalent of expensive roadway widening operations. They should also be an aid in applying adjustments and improvements to meet traffic pressures arising from war needs.

It is hoped that the method suggested in this article, or some better method that it may inspire, will be helpful in measuring roadway and intersection capacities, in measuring and increasing flow in pressure directions, in emphasizing inefficient movements, and in effecting beneficial improvements.

URBAN POPULATION

There are in the United States 1077 cities of 10,000 or more population. In these and other urban places live upwards of 70 per cent of our total population.

RURAL ROADS

The combined Federal aid system and secondary system (for 25 States in a pre-war study by P.R.A.) averaged 17.59% of rural mileage, but carried approximately 84% of rural travel.

The Functions of a City Traffic Engineering Division

by J. W. ARCH BOLLONG

WHERE should the traffic engineering division be located in the city governmental framework? Several departments in every city have an interest in the traffic problem. Those with major interests are the engineering department and the police department. The selection of the proper place in the city government for traffic engineering and the traffic engineer depends to a large extent on local conditions. He should be in close contact with the departments which build and design streets and highways. He must also have full cooperation with the traffic law enforcement and with traffic safety education. He has to do with the facilitation of traffic and the prevention of accidents from a physical standpoint. I believe he should normally be located in the Bureau of Public Works as many of the results to be attained are a function of construction.

Traffic Engineer's Duties

The traffic engineer's duties should be clearly outlined by ordinance, of which the model ordinance prepared by the National Conference on Street and Highway Safety is a good example. The city traffic engineer generally conducts studies of street traffic, accidents, congestion and other conditions affecting the safe and convenient use of the street, collects facts regarding the effect and operation of traffic regulations, formulates traffic rules and regulations, and makes recommendations regarding the same.

In particular, the duties of a city traffic engineer should include the following:

1. Designate crosswalks, establish safety zones and mark traffic lanes.
2. Choose locations at which no left or right turns shall be made and erect proper signs.
3. Designate, install and maintain loading zones, passenger zones, and street car or trolley coach and bus zones.
4. Designate location of public carrier stops and stands, such as bus, taxicab and for-hire car stands.
5. Erect and maintain traffic signs in accordance with parking time regulations established by ordinance.
6. Erect and maintain traffic signs designating angle or parallel parking.
7. Designate locations at which parking shall be prohibited entirely and erect and maintain the proper traffic signs.
8. Erect and maintain all STOP signs at arterial or through streets as designated by ordinance.
9. Inspect street and highway plans for purposes of recommending traffic facilities.
10. Erect, operate and maintain all traffic signals or other electrically illuminated traffic signs and warnings.
11. Supervise the operation of heavy and overwidth equipment regarding route, time, and load.
12. Make traffic surveys.
13. Maintain accident spot maps and traffic flow maps.
14. Make recommendations to other departments regarding openings in streets which obstruct traffic flow.
15. Maintain card file record of all signs, signals and markings installed and maintained throughout the city, such card file indicating the time and reason for placement of such regulations.
16. Prepare collision, condition and traffic flow diagrams for high accident intersections and make proper physical corrections.

J. W. Arch Bollong (Mem.) is Seattle, Washington, City Traffic Engineer. This is taken from a paper presented by the author before the California Safety Assembly, Los Angeles, April 14, 1944.

17. Make studies of safety lighting and install such lighting.
18. Make studies of locations for channelization projects and install the same.
19. Maintain traffic accident report file and make monthly and annual summaries from the same as per national standards.
20. Install, maintain and operate parking meters.
21. Prepare annual traffic control report showing the traffic accident conditions, traffic trends, number of signs, signals and other traffic equipment in place, installed, and maintained, and make plans and recommendations for future traffic safety and facility. Such report is furnished to the Mayor, City Council, Chief of Police, Board of Public Works, Traffic Judge, local Safety Council and Traffic Commission (if such Commission exists).

Qualifications of a Traffic Engineer

The traffic engineer should be an engineer and acquainted with engineering procedure. The duties entail knowledge of both civil and electrical engineering. He should be acquainted with construction and design methods and should be sufficiently aggressive to see that the known methods for traffic control are installed and applied. He should be able to get along with people and obtain their cooperation. He should be able to write and speak effectively, presenting the results of technical studies in lay language and for a clear understanding by public officials and others. He should have a comprehensive understanding of the traffic problem and its relation to other economic and social problems of the city. He should have administrative ability in order to inspire confidence and cooperation of various assistants and personnel within the department.

Personnel of a Traffic Engineering Division

A. Office - Clerical

The traffic engineer should have a secretary who handles the correspondence and filing. There should be a record clerk who maintains card files of all traffic equipment in place, installed, and maintained. Cards should be equipped with ticklers to facilitate bi-yearly traffic sign replacement. This record clerk should also act as counter clerk and telephone operator to receive and record complaints and traffic investigations requested by the general public and others.

There should be a cost clerk who maintains all cost records, stock cards, perpetual inventory, cost estimates, and budgetary accounting, 1/12 per month.

B. Office - Engineering

There should be 7 functional engineering units as follows:

1. Survey
2. Planning
3. Signals
4. Signs and markings
5. Traffic design
6. Street usage
7. Traffic investigations

There should be an engineer in charge of each one of these functions, and if the city is of sufficient size there should be an associate traffic engineer who would serve as general assistant to the traffic engineer and assist him in administrative problems. He should act as a filter for the traffic engineer to keep unimportant things from reaching him on one hand and yet on the other hand be sure that all things that are of sufficient importance be called to his attention for his advice and approval. This associate traffic engineer should be in charge of the department whenever the traffic engineer is absent from the office while engaged in field work. Assistant engineers should be in charge of the following:

1. Traffic Survey Engineer—

Duties:

(a) Decide what facts are needed
(b) Keep facts up to date
(c) Make studies for other sections
(d) Prepare survey forms
(e) Establish survey procedure
(f) Conduct research for trends

Details:

This work covers volume counts and surveys, speed and delay, origin and destination, parking, stop sign studies, street use studies, pedestrian counts, accident analysis, congestion analysis, charts, graphs, trends, and traffic warrants. Office work includes spot maps, condition diagrams, collision diagrams, flow maps, before and after studies, and enforcement analysis.

Reason:

Traffic facts must always be obtained before any action is taken. First, the facts must be obtained in the field by surveys. Second, these facts must be presented statistically and prepared in useful form. Third, the data must be analyzed and conclusions and recommendations developed.

2. Traffic Planning Engineer—

Whose duties should cover the following:

(a) Long range planning
(b) Economic studies
(c) Administrative planning

Details:

He should cover traffic planning of the major street system, primary access streets, bypass streets, freeways, waterfront traffic plan, municipal parking lots insofar as land use is concerned, offstreet parking design, filling and service station control, preparation of standards, preparation of signal, sign, and street marking code, survey manual, and monthly and annual program.

Reason:

Constant progress can only be made by planning. Individual corner problems must be solved but attack on individual corners will produce confusion unless they are attacked on a planned program and systematic basis. While the immediate problem must be solved it is vital that considerable thought be given to the future.

3. Traffic Signal Engineer—

Duties:

(a) Signal specifications
(b) Signal drawings
(c) Working drawings
(d) Cost estimates
(e) Material orders
(f) Compliance with state warrants
(g) Railroad and bridge signals
(h) Safety lighting design

Details:

This work covers the installation of conduit, erection of signal posts, mounting of signal heads, signal wiring, timer wiring, overhead and underground wiring, span wire installation, central station equipment, illuminated beacons (both suspended and island type), and illuminated danger lights. In connection with the operation of signals he should cover adjustment of total cycles, adjustment of proportion of time in each direction, adjustment of turning periods, speed control, progressive control, pedestrian control, and hourly variations.

In the maintenance of traffic signals, the duties should cover oiling of equipment, bulb replacement, timer overhaul, housing painting, lense cleaning, and other items of maintenance.

Reason:

Traffic signals are primarily needed at intersections to cover heavy volumes, speed, and continuous progression to bring order out of conflicting movements and pedestrian movements.

Safety lighting is a comparatively recent addition but a very prime and well-recognized need.

4. Traffic Sign and Marking Engineer—

Duties:

(a) Design and supervision of installation of traffic signs
(b) Design and supervision of installation of all markings on the street either by paint, buttons or permanent traffic line means.

Details:

This position will cover stop, caution, slow, and directional signs, sign maintenance, sign painting, sign construction, sign reflectorization, illuminated signs; and in line marking will cover center lines, lane lines, channelization lines, stop lines, crosswalk lines, parking meter lines, and the installation of reflecting line markers or permanent lines of the button or concrete type.

Reason:

Traffic signs and markings inform motorists where certain laws apply, regulate their movement, warn them, caution them, and give them information.

5. Traffic Design Engineer—

Duties:

(a) Close cooperation with the construction division of the engineering department
(b) Development of new design
(c) Design economy

Details:

In traffic islands this will cover button design, left turn islands, medial dividers, right turn islands, pedestrian islands, (including height, length and width of each), curb design, and island illumination or reflectorization.

In channelization this will cover wide intersections, offset intersections, "T" intersections, multiple intersections, rotary traffic, turning control, islands for signals, lane control, and accelerating and decelerating lanes.

Under new construction this will cover checking of all plans relative to intersections, viaducts, grade separations, freeways, elevated highways, type of pavement, grades, curves and crown, and such other future permanent improvements.

Reason:

The shape of the intersection and the paths of vehicles and pedestrians will control the safety and speed of movement on roadways. Islands, channelization, and traffic design are physical enforcements which control the paths of vehicles and pedestrians in such a way as to obtain the maximum use of the available street space.

6. Street Usage Engineer—

Duties:

(a) Parking regulations
(b) Offstreet parking
(c) Building loading bays
(d) Warrants for restrictions
(e) Parking maps

Details:

This position covers the location of bus and trolley car zones, truck zones, taxicab zones, passenger zones, terminals, bus and trolley car routing, truck routing, special routing for athletic events, parade routings, and in the present day, war worker routing.

This will also cover the installation, maintenance and operation of parking meters, including new locations, meter usage, and proper records.

Reason:

Use of the street can influence its efficiency. Traffic must be routed and dispatched efficiently. Stopping, standing and parking must be arranged for and special arrangements must be made for war traffic (at the present time), for athletic event crowds and other large assemblages, or other overload conditions.

7. Traffic Investigator—

Duties:

(a) Special problems
(b) Checking changed conditions
(c) Answer official requests

Details:

This man has to do with contacting the general public regarding traffic operation and control. He investigates complaints with regard to dangerous corners, signals out, signs down, blocking of streets by truck loading or other car operation, high speed, left turn difficulties, time regulations, bus, truck or passenger zone creation, and zonings

needed; and makes proper recommendations with regard to corrections.

He investigates what are known as "hot spots"; that is, accident and congestion concentration, pedestrian complications, loading difficulties, construction detours; and should check before and after operation at new signals, new signs, and new regulations. He should be report writer for the department, to furnish monthly reports, annual reports, educational reports, cover the inter-city contest report, and such other items of similar character.

Reason:

Traffic movements are not static. They are dynamic and are constantly changing. As traffic conditions change they must be investigated to ascertain whether or not the traffic engineering methods and equipment should be changed or adjusted to fit the new conditions. The public has a right to ask questions about what is being done and what is not being done. This right results in complaints and recommendations from citizens, businesses, organizations, and associations. These complaints and recommendations must be answered immediately or the reputation of the organization will suffer. This requires a highly trained traffic investigator.

C. Field and Shop Personnel

In order to operate efficiently the Traffic Engineering Division should have adequate shops and equipment for construction, installation, operation and maintenance of the traffic equipment in and on the street. These shops should be divided into an electrical division, stock room, sign painting division, and sign storage division.

A construction foreman should be in charge of these shops. Under this foreman should be the following crews:

1. Electrical construction and maintenance crews consisting of linemen, cable splicers, and electrical maintenance and operation crews. One skilled electrical wireman or lineman should be designated for repair, oiling and other maintenance of traffic signal controls.
2. Traffic signal operation crew which should consist of sufficient skilled electrical personnel equipped with tower trucks or "Crow's Nest" trucks, and on 24-hour duty for operation of traffic signals.
3. Traffic sign crew, consisting of men (with trucks) to install traffic signs under a pre-determined schedule.
4. Traffic line marking crew, equipped with proper mechanically operated painting machines to install and maintain traffic lines.
5. Traffic sign shop crew, consisting of painters and helpers furnished with buttons, silk screens, sand blasting equipment and other materials to properly maintain traffic signs and signals from a painting standpoint.
6. Parking meter shop, consisting of subforeman and parking meter repairmen to properly maintain and operate parking meters.
7. Channelization crew, equipped with trucks, compressors, etc., for the installation of channel and other type islands. Efficient operation of these field crews necessitates their substitution from one class of work to another in order to fit in with weather conditions in certain localities.

TELEVISION

Use of television in metropolitan traffic control was forecast by Ralph R. Beal, assistant to the vice president in charge of R.C.A. laboratories, at a meeting of the Engineering Society of Detroit.

Beal said that cameras could be installed permanently at busy intersections to flash to traffic headquarters up-to-the-minute picture accounts that should aid traffic experts in easing congestion.

Building Post-War Highways for Safety

by PYKE JOHNSON

CONGRESSIONAL highway legislative interest now centers in the Robinson bill (H.R. 4853) introduced in May and presumably representing the conclusions of the House Roads Committee after extensive public hearings.

This would authorize $500,000,000 in Federal highway funds in each of the first three postwar years—$225,000,000 for Federal-Aid primary roads in and out of cities; $125,000,000 for farm-to-market roads, including routes in cities below 10,000 population, and $150,000,000 for Federal-Aid routes in cities over 10,000 population.

The city fund would be distributed to states on a population basis. The other two sums would be distributed on the traditional equally weighted factors of state area, postal road mileage and population. Local matching would be on a 40 percent basis the first year, and on a 50-50 basis thereafter.

The bill also provides that right-of-way costs shall be part of construction costs; the funds can be spent on highway flight strips where the Public Roads Administration approves, and PRA is to control highway signs, signals and pavement markings on all roads and streets receiving Federal Aid, and is instructed to reject such controls as hamper safe and efficient movement of traffic.

This legislation will set the course of development for the next quarter-century. It includes authorization for PRA and the states to designate jointly a national inter-state highway system of up to 40,000 miles—an outgrowth of the Interregional Highway report. States will, however, have large discretion in routes and design standards on this system.

While the traditional PRA-state highway department relationship is continued unchanged in the Robinson bill, secondary road funds are to be adminstered on a road system selected by the states in consultation with local highway agencies and subject to PRA approval.

Interregional Highway Report

The Interregional Highway Committee, headed by Chief MacDonald of PRA, recommended that city sections of interregional routes get first attention, and that additional city routes be included to create a balanced network of radial, beltline and cross-town arteries of modern limited-access design. As rural sections go through their next normal rebuilding, the Committee recommended rebuilding to ultimate standards of design, right-of-way and location. Because of their age, many rural interregional routes are ripe for immediate postwar reconstruction.

The true value of the Interregional report lies in its relation of traffic volumes to design standards, plus its comprehensive treatment of urban highway planning principles. These factors apply to any highway, anywhere, and to any city, on or off the selected routes. Because of this sound approach, based on data from the nationwide state highway planning surveys, the Interregional Highway report is the

A digest of an address by Pyke Johnson (Affil.), President, Automotive Safety Foundation, Washington, D. C., given before the Michigan State-Wide Safety Conference, Street and Highway Section, at Detroit, Michigan, on May 25, 1944.

master plan for future highway construction. The exact location of the recommended routes is not important because settlement can be made later in each state.

Engineering Design for Safety

Leading safety engineers like Sidney Williams, General Manager of the National Safety Council, call the Interregional Highways report "the greatest single contribution ever made to highway safety." Mr. Williams points out that half of all fatal rural accidents would be physically impossible on roads with the recommended center dividing strip between opposing traffic lanes, and that still more accidents will be impossible with grade intersection elimination, limiting of access points, provision of special pedestrian facilities, and other modern design features.

The National Safety Council now is making a national study of accident records on highways shown on the Interregional Committee map, and of those few highways whose standards approach the recommendations for the future system.

Up to now, we have only scattered data of this kind—the Merritt Parkway record of three fatal accidents in 357 million vehicle-miles of travel, compared to the national average of 16 per 100 million vehicle-miles; the New Jersey accident reductions on divided highways; some specific reductions when dangerous intersections were redesigned, and so on. Our whole system of accident auditing and analysis, I am sure, is in for vast improvement and extension as a result of the current National Safety Council studies.

Some of our leading traffic and highway engineers are convinced a 75 per cent reduction in fatalities will occur on roads getting the design treatment outlined in the Interregional report. Advance engineering projects listed by PRA now indicate that over 1,000 miles of such limited access roads will be built in the immediate postwar period. This is a greater mileage of such roads than now exists in the whole nation.

When such engineering design enters the picture, education and enforcement can be concentrated at less cost and greater effectiveness on remaining hazards, and on roads that carry too little traffic to merit ultimate engineering design.

Michigan Looks Ahead

Michigan is one state that has taken the important first step. It has built two demonstration projects—the Davison Avenue and the Willow Run expressways. The Willow Run project now is being extended to the Detroit city limits, and immediately after the war is to be projected across the industrial heart of Detroit.

These two highway projects make the postwar pattern of urban and urban-approach highways in Michigan definite. No more major street widenings will be undertaken when heavy traffic is involved. Had we been able 25 years ago to see ahead, we would have saved millions of dollars and thousands of lives by road and street projects not doomed to early obsolescence.

This is not said in the slightest criticism of our road builders. The auto industry itself did not dream that traffic would soar as it has in the last two decades. Forecasters have been consistently wrong in predicting a saturation point. What that point is, we do not know to this day. All we know is that the postwar market is the largest in history, and that traffic will increase substantially over prewar levels.

Cities and Counties, Act!

To save money, and to save lives, we must permit our traffic and highway engineers to design and build postwar roads to cope with expected traffic increases. Through the state highway planning surveys, we have the best

possible data for estimating those increases, and for intelligent postwar programming, well balanced between rural and urban requirements.

The passage of the Federal postwar highway authorization will mean nothing unless states and counties and cities act to meet their share of the responsibility.

Specifically, state legislation will be needed enabling the highway department to work with city and county governments on definite programs. There must be provision for advance acquiring of rights-of-way, and state and local legal and financing problems must be worked out in advance.

All these have a definite reference to highway safety, because safety is not an end in itself, but is a result of doing right things the right way.

Municipal Engineers, Listen

by WALTER S. PAINE

WHY SHOULD the engineers of our municipalities be a responsible factor in one of our greatest social and economic problems, namely, the conservation of life, health, and property?

Historically, engineering is one of the oldest professions of which we have any record. Engineering had its beginning in the military field and then was developed in the field of transportation. This heritage alone should be an impetus for the average engineer to take a vital interest in our present traffic problems. The old saying of a famous English engineer who defined engineering as *the art of directing the great powers of nature for the service of man* should also definitely align us with the key men who are endeavoring to maintain present rapid transportation with safety. Too long has the engineer been kept in the background of this difficult civic problem of conservation and this problem will never be solved until the engineer is given his rightful place in a community-wide plan to achieve freedom from accidents.

This is taken from an address presented before a group of city and town engineers attending the Yale Traffic Engineering Conference (see May issue, page 209). Walter S. Paine is manager of the Engineering Inspection Department, Aetna Casualty and Surety Company, and has for many years been an outstanding figure in Conservation Engineering.

Iron Out the Bungling

Some politicians, chiefs of police and well intentioned citizens, who know little of traffic engineering, have innocently, through assigned authority, bungled the placing of traffic signals, signs and other traffic controls. Because of this bungling, the general public has thrown up its hands in an attempt to keep abreast with disciplinary methods which they have found inefficient and impractical. You engineers should be able to iron out some of these problems.

Any able engineer always attacks his problem analytically. He will survey the field to get the best data obtainable upon which to forecast his plans. He will catalog the failures of others and try to avoid a repetition. Basic engineering principles will provide his foundation and he will use the plans and features which have been successfully tried and found effective.

Any wise engineer will not depend upon his own ego or any pet ideas. He will keep his hand on the pulse of

public opinion and listen to the findings of the greatest research laboratories in the world, namely, the actual experiences of the automobile operators.

There are many things the engineer can do diplomatically, intelligently, and through dogged effort to change the static or archaic ideas of some of our super-conservative citizenry and politicians, but he must have sound reasons for making these needed changes.

The traffic lights which have been planted without any rhyme or reason must be revamped. As experience shows, such changes are necessary. Traffic must be expedited by intelligent synchronization of all stop and go signals, especially through our boulevard arteries. The stop signs which have been located "by guess and by gosh" must be studied and set up to mean something to the thoughtless driver or the automobilist who is a stranger to our city streets.

Look Ahead to New Routes

Post-war planning will see many new arteries strung out through the States. The city engineer should be alert so that his post-war planning also may provide diverting lanes to care for this new flood of motor vehicles of all descriptions which may be clogging our city streets. He must be prepared to see that the state highway does not connect with the city streets so as to cause chaos with the building up of traffic. Remember, the state engineer is not infallible and the city engineer may be in a position to pass on to our Federal and State Highway Commissioners many valuable ideas to avert the present conditions which we are experiencing in our municipal traffic problems. Be prepared to meet these problems and, if you can prove that you are right, make yourself felt. An engineer does not need to be a molly-coddle.

Prove Your Case

Study your city for parking places now so much in demand, both inside the city and on the outskirts of our city properties. Know where to locate and not to locate one-way streets and, before making any recommendations, be sure that any such changes will be an impetus to the speeding up of traffic and the saving of human lives. If "No Parking" streets are necessary, be prepared to prove your case. If there are specific locations in your city where pedestrians for years have been killed or injured, there must be some reason for this massacre. Set your wits to work and develop the answer, for you will find the solution of such a problem much easier than struggling with a problem in calculus. Do not be afraid to advocate a boulevard with division strips and all the safety measures known providing you have first thoroughly proved your plan and know, from the experience of others, that your suggestions will do the trick.

After the war you will see the lighting of our streets loom up a most important phase of our effort to reduce accident frequency and severity. When six out of ten persons are killed after dark despite the fact that three out of four cars are not on the road after sunset, you have a problem which must be solved. The location of lights, the intensity, the prevention of glare are problems you must be ready to work out with the illuminating engineer and it will not be one for easy solution.

Very little attention has been given to the study of pavement widths, general street design, curbing radii at intersections, aisles of safety, safe crossings, and many other features which can reduce accidents. These features furnish a real research problem for the engineer who wishes to make a contribution to engineering and public safety.

Scotchlite REFLECTI

REG. U. S. PAT. OFF.

THE SHORT CUT TO
SIGN REFLECTORI

The ideal material for reflective sign jobs really describes "SCOTCHLIT
for regardless of the size, shape or design of the sign or marker it can
fabricated with "SCOTCHLITE" quickly—efficiently. "SCOTCHLITE" co
in roll form of various widths and is applied with an adhesive, there
eliminating the use of bolts, housings, etc. in installation.

Add such features as high reflective brilliance, color variety of wh
yellow, silver or red, flexibility and low cost to its ease of application
maintenance and you can readily see why "SCOTCHLITE", the modern
of reflectorizing signs, is the ideal material for all types of sign installati

EASIER TO READ

EASIER TO APPLY

EASIER TO MAI

When writing to advertis

TIGN MATERIAL *24 Hour Visibility*

T TSIER, QUICKER, MORE EFFICIENT
RI IS WITH "SCOTCHLITE"

MINNESOTA MINING AND MANUFACTURING CO.

GENERAL OFFICES: SAINT PAUL 6, MINN.
BRANCHES IN PRINCIPAL CITIES

rite today for this formative free booklet "SCOTCHLITE"

TE644

Minnesota Mining & Manufacturing Company
900 Fauquier Avenue, Saint Paul 6, Minnesota

Gentlemen: I'd like a copy of the booklet on "SCOTCHLITE".

Name_____

Address_____

City_____ Zone___ State_____

Conservation—A High Purpose

The mechanical, chemical, and electrical engineering fields may have their fascination and profitable attractions. The diesel and the airplane power units may fascinate the mechanical engineer. The electric power units may fascinate the electrical engineer. The chemical reactions producing synthetic rubber may tickle the fancy of the chemical engineer, but none of these offer a field of greater usefulness than that provided for the conservation engineer. What is more satisfactory and inspiring than to know that, when the whole world seems to be destroying life, you are accomplishing engineering revisions that conserve life and, above all, that you are aiding in meeting the great problem of transporting human beings and material quickly and safely and, in this way, greatly reducing human suffering.

This immense problem can be met by engineers who, with diplomacy, adapt engineering principles to work out practical solutions. You can, through intelligent analytical methods, ascertain the factual causes and provide corrective methods through engineering revision to reduce our present high frequency and severity of accidents and then, with persistent energy, keep hammering away until progress is an actually accomplished fact.

While touching on the problem of conservation and looking at this phase of our engineering from a long range view, the municipal engineer can do a great deal toward actually conserving life, health, and property. Building codes are coming into vogue throughout the entire country. Engineers are more and more seeking ways of reducing the terrible loss of life and property by fire. Wide awake engineers in our enterprising municipalities are providing purer water supplies and giving careful consideration to producing sanitary sewage systems. The public utilities, in cooperation with city engineers, are doing much to eliminate our electrical hazards. The builders of sidewalks and curbings are giving more careful consideration to their construction work so as to reduce the hazards of falls to the aged and thoughtless. While these latter items have no place in our present discussion of the automobile traffic problem, they are so linked into our municipal life that, as the engineer gets interested in one phase of conservation work, he feels inspired to assist whenever possible in these broader aspects of an engineer's life because of the social and economic features which mean so much to a prosperous and favorably publicized municipality. But, above all, this broader life for the engineer puts him on a par with the physician, the lawyer, the teacher, or any other professional man because he has a part in the highest purpose of living—that of reducing human suffering and saving life.

PLAN NOW TO ATTEND
I.T.E. ANNUAL MEETING

Chicago - October 1, 2, 3, 4

SHERMAN HOTEL **MAKE RESERVATIONS NOW**

Post-War Speeds

by EDWIN KOESTER

IT IS QUITE evident that the future of highway transportation will depend upon its service to industry and commerce in competition with the other modes of transportation, and that the facilities that are urged for its utilization and expansion will in themselves constitute an element in the struggle for dominance. The accent will be upon speed for industry and commerce, but stimulation of the business pace will give added impetus to the general drift toward higher speeds.

The return of several million men now serving in the armed forces overseas, and their resumption of normal peacetime activities, is another factor that promises a quickened tempo. These men have experienced speed and excitement, and in all probability at least periodically they will crave and demand activities to gratify recurrent longings for action.

Until travel by air becomes more available to these and other millions, the passenger automobile is most certain to be the vehicle for these human reactions.

U. S. Motor Vehicle Mileage

According to a very recent report submitted to the special Senate Committee on Post-War Economic Policy and Planning by the Automotive Safety Foundation, the United States owns half of the world's surfaced highways, and 70 per cent of its motor vehicles. In these vehicles, and over these highways, we last year traveled 350,000,000,000 miles.

During this period of our war effort, according to the report, 34,000,000 motor vehicles and a million and a half miles of surfaced roads played a major role in the expeditious movement of passenger, freight and military traffic. Restrictions imposed by rubber and gasoline shortages have temporarily affected vehicular statistics, but within future months speeds more consonant with normal vehicular movement will again be witnessed.

Many articles are being written concerning transportation facilities in and between our cities and states, and much thought is being given to the problems of construction and reconstruction, and to the subject of extensive and intensive use of streets and highways.

Congress is at this time considering the passage of legislation and will appropriate billions for the construction of super-highways. Provision will be made for national, state and urban facilities, and plans will undoubtedly embrace modern designs to remove present bottlenecks in the free movement of traffic, and to allow even higher speeds upon limited access highways and super-highways with accelerating and decelerating lanes. Grade separations, by-pass and relief streets and highways, and similar roadway and intersection designs are instrumental primarily in providing traffic safety and facility of movement, and do not in themselves carry implications of higher speeds, but they do give assurance that roadway development will fully keep pace with progress in mobile equipment.

Speed Controlled by Vehicle Designers

Some years ago the proposal was made to control speed at the manufacturing level, and the recollection is that it was classed as a deterrent to real progress in the automotive field. A solution from this source seems im-

Edwin Koester (Assoc.) is Traffic Engineer, City of Wilmington, Delaware.

probable, and I think it may therefore at this time be dismissed from consideration.

Although the consensus of opinion is that the effort to get back into production as rapidly as possible militates against any radical change of design within several years, the probabilities favor the later use of aluminum and plastics to effect economy in operation through weight reduction, and at least the implication is present that higher speeds may be an end product.

The Answer to the Speed Problem

Assuming the elimination of any possibility of final control through vehicle or highway design, it is evident that the burden of speed control will remain at the operational level and will continue as functions of state administration and the police.

Probably the most effective and sensible approach to a program of action is to present to the driver every advantage that is inherent in any system of controls, and then demand that he obey every authorized regulation pertaining to the operation of motor vehicles.

By using the shortest advantageous cycle length at controlled intersections, the incentive to cheat on the light indications is reduced to a minimum. By arranging for progressive movement through a series of lights at a reasonable and definite speed, the urge to rush with inordinate haste is considerably lessened. Elimination of unwarranted STOP and SLOW signs, with attendant education and enforcement will to a certain degree assure greater respect for those remaining. Rearrangement or expansion of street and highway facilities to minimize congestion, inconvenience and delay represents a means of at least partially removing the irritants that provoke violation of traffic rules.

Posting of prevailing top speeds in municipalities and upon rural highways, including the zoning of curves, tangents, intersections and of other dangerous conditions is not only advisable, but essential as an element in the plan to promote observance of reasonable speeds.

Education in all its accepted forms will continue to provide the means of imparting information and warning.

Drivers' Examinations

Perhaps another recommendation that deserves serious and prompt consideration is that passage of a physical and mental examination be made a requisite for the issuance of drivers licenses, and that periodic checks be used to merit the continuance of this privilege.

It is conceded that the conveniences provided for motorists will never attain the perfection desired, and that patience will not in all instances hold in check the human emotions that cause traffic accidents. But with a background of sound engineering practice, the role of enforcement may be strengthened by the knowledge that the driver has been given every possible advantage and must be held accountable for his infractions, particularly those that result in injury or death.

Beyond these considerations, one element that remains of prime importance, particularly in the operation of pleasure vehicles, is "overdriving" the ability to control the car. Regardless of the reasons that prompt overdriving, emphasis must be placed upon the consequences that attend violation of this limitation of human reaction, and penalties must be invoked to compel a rather general observance of speed limits.

As has been advocated numberless times before, this enforcement must be active, intelligent and progressive, starting with only the most flagrant cases and gradually tightening the controls.

Finale for a Phantom

How G-E engineers produced a safer optical system for traffic signals

"Phantom" light in traffic signals, which is caused by rays of the sun, gives a false appearance of the light being "on." Once a much more serious factor than it is today, it used to present a real hazard to drivers.

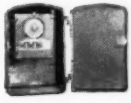
Analysis of "phantom" indications by G-E engineers revealed the cause: Rays from the sun passing through the lens were being redirected out again.

By carefully designing a combination of reflector, lens, and visor, this undesirable factor was largely eliminated—and all G-E traffic signals have for years included this phantom-free optical design.

This development is typical of the important contributions to safer, more efficient traffic control that are constantly being made by G-E engineers. Their continuing research is your assurance that the name "G-E Novalux" stands for traffic control equipment that will actually accomplish what you are trying to achieve.

For full information, and assistance in selecting the correct units, get in touch with the nearest G-E office. *General Electric Company, Schenectady 5, N. Y.*

G-E NOVALUX TRAFFIC SIGNALS—available with any desired phase and color sequence



G-E NOVALUX TRAFFIC CONTROLLERS — adjustable and fixed, meet any traffic need

Novalux TRAFFIC CONTROL

GENERAL ELECTRIC

453-30-3270

BUY WAR BONDS

When writing to advertisers, please mention TRAFFIC ENGINEERING

Failing in this effort, the future speeding of highway transportation agencies in their coming competition with movement by rail and air will result in inordinate increases in accidents, injuries and fatalities. Dwarfing even these figures will be those recorded by passenger automobiles. Millions of service men will soon return, many with permanently stepped-up desires for speed and excitement, and to these the automobile will represent the most available and potent agency of thrill gratification.

As is customary in all law enforcement, a program of speed control will provoke a battle that may challenge the integrity of any campaign to lessen assault and battery by automobile upon the streets and highways of the nation. Unless an adequate program is undertaken and carried through, however, we shall witness a record of slaughter that will exceed all previous experiences.

LOCAL TRANSPORTATION COORDINATION URGED

A progress report of the Committee on Highways and Transportation, which stressed that cities must be free from serious street congestion if they are to be good places in which to live and in which to do business, was accepted by the American Society of Planning Officials at its annual business meeting in Chicago during May.

"This can be done," the report stated, "only if each form of transportation is planned and provided for in that part of the job which it can do best."

"It is therefore essential," the report continued, "to consider *all* local transportation facilities together and in relation to future urban development, in order to be able to determine the actual *need* for any one kind of service."

In the matter of "expressways," the committee urged coordination of such projects with each other under some type of metropolitan authority. It further suggested a tie-in with community planning, housing and other public works and advocated creation of Federal, state and local land authorities for acquisition of land needed for *all* public purposes including highways. Committee members noted the three following significant developments in highway building of the future, (1) Acceptance of the freeway or limited-access principle, (2) recognition of the importance of urban traffic in the national highway building program and (3) assumption that the design will provide for "all-service" usage in urban areas.

Recognizing the role of transit, the Committee emphasized that forward-looking action is required of transit management and highway and planning officials. The former, it suggested, must participate in community planning and other significant activities of local government, while planning and highway officials must develop an understanding of the necessity for good, cheap, daily transportation of masses of persons if the urban center is to be maintained, and action must be taken to remove burdens (such as antiquated franchises) and in giving aid when necessary to establish or maintain service of the kind needed.

The ASPO Committee recommended that responsible public authorities institute factual analyses to determine the overall parking needs, in order to meet the increased parking demand in central districts that is certain to follow the completion of new highways. Consideration should be given, in the planning of such parking facilities, to their location in respect to transit facilities, it was said.

Similarly, the report noted, present and future local airports should be planned so that they will relate to other transportation facilities and to future development of the urban area.

Terminal consolidation and relocation, it was said, are a problem both carriers and communities must face together—the carriers because of present inefficiency and high costs of terminal operations, and communities because of the need for removal of one cause of interior street congestion and of urban blight.

Intending to delve further into anticipated developments in the transportation fields and the implications to community planning, the Committee will attempt in the near future to agree on some of the things local governments can do in order to be prepared with transportation projects of the kind needed for construction in the immediate post-war period.

POST-WAR STREET LIGHTING

by H. E. MAHAN

Sensational articles in the daily press and in magazines have led our people to believe that the return of peace will make obsolete everything we now have. Many municipal and utility officials hold this view concerning street lighting and are advocating the postponement of plans for post-war projects, expecting radical changes in light sources, luminaires and technique. It is always dangerous to forecast future trends but it is only common sense to proceed on the basis of existing knowledge.

The most radical change that can be detected in the street lighting situation is the probable greater acceptance on the part of the public and the utilities of higher levels of street lighting. The experience of the dimout has done more to bring this about than the many years of education by the lighting industry. People have learned that accidents and crime increase with reduced street lighting; they have learned that the removal of glare adds comfort and increased visibility; they have found it inconvenient and cheerless to wander around dark cities. The utilities have a greater realization of the value of street lighting as a vital factor in establishing and maintaining good will, and are more inclined to view the load as desirable both from this standpoint and as a revenue producer. Thus it appears that the prospect for improving and modernizing street lighting in the post-war period is exceptionally promising.

Luminaires possessing the characteristics required to satisfy this "new" kind of lighting are ready for production as soon as war time limitations are removed. In fact, some of them were in production before the war, but because they were too far in advance of public appreciation or because of war restrictions they have been put aside for the duration. In other words, we anticipate no radical changes in post-war luminaires nor in the technique of application. Actually what is happening is that the public is catching up with our established standards of street lighting rather than setting up new standards requiring new designs.

The indications today are that the bulk of street lighting will continue to be done with the filament lamp; that the mercury and sodium systems will gain adherents and that the fluorescent lamp has many limitations to overcome before it is adaptable to general street lighting use.

The Traffic Engineering Handbook is a safe guide for future practice, and the traffic engineer should play a prominent part in using street lighting as a tool to reduce accidents and expedite traffic with safety.

An original article by H. E. Mahan, Manager, General Electric Illuminating Laboratory, Schenectady, N. Y.

ITE NEWS AND PERSONALS

Who's Who Among I.T.E. Members

Major George Barton was selected for this issue of Who's Who Among Institute Members as representative of the many members of our profession who are serving the Nation overseas in the armed forces.

Of the Total Membership, 32% are in the armed forces, 8% are overseas, an indication of the substantial contribution being made by traffic engineers on the fighting front.

Indicative of the importance of Major Barton's work is the Legion of Merit medal which was awarded him by General Eisenhower.

GEORGE W. BARTON, member of the Institute of Traffic Engineers, now a Major in the U. S. Army, overseas, was born in Assumption, Illinois, on January 21, 1906. He attended Northwestern University and received a B.S.C.E. degree in the school of engineering.

Upon graduation, he was employed by the Illinois State Highway Department and shortly after he accepted a position with the Chicago Motor Club as a highway engineer.

Mr. Barton holds a unique position in that he not only is considered an outstanding expert in traffic engineering, but is also regard as an authority on safety education. He was one of the pioneers in the development of traffic engineering in the country. In his organization, he developed a traffic engineering department which accomplished so many results that Mr. Charles M. Hayes, president of the Chicago Motor Club, appointed him a member of the Board of Directors at the remarkable age of 25.

Chicago Motor Club

In 1934 he became head of both the Safety and Traffic Engineering activities of the Chicago Motor Club, a title which he actively held until entering the services of his country.

Enters Army

In July, 1942, Mr. Barton left the Chicago Motor Club and entered the services of his country as a Captain in the Transportation Corps upon the request of the Army. In this capacity,

he served in London during the preparation for the invasion of Africa. He was a member of the expeditionary forces that invaded Africa and his outstanding knowledge of transportation again gained him much recognition. Shortly after the invasion he was promoted to the rank of Major which he now holds.

On July 3, 1943, by command of General Eisenhower, Major Barton was awarded a Legion of Merit medal. This award was presented because of his outstanding services as Chief of the Land Traffic Division where he was charged with the clearance of vitally needed supplies from the port of Oran. His keen foresight contributed greatly to the smooth, timely and efficient movement of Allied supplies and equipment from the port, and above all, his constant devotion to duty and tireless efforts in maintaining a high standard of operational efficiency were an inspiration to all those with whom he worked.

Major Barton is now serving his country somewhere in Italy with the 5th Army.

New England Traffic Engineering Conference

The Second New England Traffic Engineering Conference will be held at the Massachusetts Institute of Technology, Cambridge, Massachusetts, July 13th and 14th.

The Conference, co-sponsored by the Massachusetts Institute of Technology and the Massachusetts Department of Public Works, will focus its attention on what should be done now in the field of traffic engineering toward planning to meet post-war traffic problems in the New England cities and states.

Among the subjects to be discussed at the Conference will be the following: financing post-war traffic aims; constructing limited access highways; effect of the design details on highway efficiency and accidents; planners viewpoint on whether urban traffic will grow or shrink; place of rapid transit in the future of urban transportation; express roadways in cities and their relationship to the parking problem; and a special panel discussion on what is being done now in New England toward making specific plans to meet the post-war traffic problems.

The Conference is expected to attract hundreds of New England municipal and state engineers, transit executives, planners, and other men having an interest and responsibility in post-war traffic matters.

Co-Chairmen of the Conference Administrative Committee are Professor Charles B. Breed, Head, Civil Engineering Department, Massachusetts Institute of Technology; and Mr. Herman A. MacDonald, Commissioner, Department of Public Works. Other members of the Committee are: Professor A. J. Bone, Highway Engineering Department, Massachusetts Institute of Technology; Mr. E. F. Copell, Traffic Engineer, Massachusetts Department of Public Works; and Mr. H. F. Hammond, Director, Traffic and Transportation Division, National Conservation Bureau, who is serving as Conference Co-Ordinator.

The speakers will include nationally prominent as well as regional leaders in the traffic engineering field.

Michigan State-Wide Safety Conference

Many I.T.E. members attended and participated in this Conference in Detroit on May 25th and 26th. In the meetings of the Street and Highway

Section, under the Chairmanship of Maxwell Halsey, Executive Secretary, Michigan State Safety Commission, the following Institute members were speakers:

Sidney Williams, Pyke Johnson, Burton Marsh, Harold Hammond, and Lloyd Reid.

Uniform Codes Committee Meets

The Committee on Uniform Traffic Laws and Ordinances of the National Conference on Street and Highway Safety held meetings June 13th-15th, in Washington, D. C., to consider proposals for changes in the Uniform Vehicle Code and Model Traffic Ordinances.

Institute members who are on this committee are as follows:

Capt. John Beakey	E. J. McIlraith
Donald Berry	Major L. W. McIntyre
J. W. A. Bollong	Hawley Simpson
Norman Damon	Wilbur Smith
Harold Hammond	Leslie Sorenson
Major F. Kreml	T. E. Transeau
Burton Marsh	Major Arnold Vey
W. W. Matthews	Sidney Williams

New York I.T.E. Section

The June 9th meeting of the New York Section was held at the Hotel Holley under the chairmanship of Harry Koch (Mem.), Head Transportation Specialist, War Department Transportation Corps. It was decided to postpone regular meetings until the Fall.

Those attending were:

Harry Koch, Chairman	Stuart Hawley
Henry Evans, Secretary	Virden Rittgers
Nathan Cherniack	Paul Stricker
John Gibala	Cornelius Cahalane, Guest
Charles Gordon	W. C. Jaeger, Jr., Guest
Paul Green	L. M. Orton, Guest
Julien Harvey	Walter Spratt, Guest

Charles Gordon (Affil.), Managing Director, American Transit Association, led a discussion centering on the place of public transit in the post-war transportation problem. Mr. L. M. Orton, New York City Planning Commissioner, added his views to those expressed by Mr. Gordon. Mr. Cahalane, of the Port of New York Authority, gave a very interesting account of the development of traffic tunnels in Europe and this country.

Washington, D. C., I.T.E. Section

Twenty-six members and guests attended the dinner of the Washington Section, Institute of Traffic Engineers, at the Fairfax Hotel on May 17. Mr. E. D. Merrill, President and General Manager of the Capital Transit Company of Washington, and President of the American Transit Association, spoke informally on post-war problems of mass transportation.

In the election of officers for next year, Charles W. Prisk, Public Roads Administration, was elected Chairman, to succeed D. Grant Mickle, and William G. Eliot, 3d, also of P. R. A., was elected Secretary-Treasurer, to succeed himself.

There will be no further meetings of the Washington Section until Fall.

Seattle T. E. Division Annual Report

An interesting and comprehensive city traffic engineering department annual report has been issued by the Traffic Division, Engineering Department, City of Seattle, Washington.

The report outlines all the important 1943 activities, under the direction of J. W. A. Bollong (Mem.), and concludes with a series of recommendations, dealing with addition of personnel, construction of traffic facilities and control devices, legislation, enforcement, education and terminals.

PERSONALS

Lloyd (Dutch) Reid (Mem.), City Traffic Engineer of Detroit, was elected Vice President and Executive Secretary of the Michigan Engineering Society. T. T. WILEY (Mem.), Detroit Associate Traffic Engineer, was also made Editor of the *Michigan Engineer*, official publication of this Society, dedicated to the advancement of engineering and engineers of Michigan.

George Papageorge (Assoc.) has been granted a leave of absence from the Georgia Highway Department to act as the Director of the Public Works Panel of the Agricultural and Industrial Development Board of Georgia. His work will consist of planning of state and local public works such as streets, highways, airports, public buildings, housing, sewage disposal plants and water supply systems.

Major Lewis McIntyre (Mem.), overseas with the Allied Military Government, in a recent letter wrote, among other things:

"Some things I remember very indistinctly. A glass of tomato or grapefruit juice, crisply fried bacon, a pancake with maple syrup, a dry cereal, a poached egg on whole wheat toast, or even a nice soft boiled egg, sweet cinnamon rolls with nuts on a Sunday morning with delicious freshly made coffee—perhaps some sausage. Yes, those were the happy days.

Major Harry H. Harrison (Mem.), on leave, Illinois Division of Highways, writes from Italy, in part:

"I get pretty homesick at times but otherwise I'm O.K. and have enjoyed excellent health. A brief record of my travels which I think the censor will pass follows.

"Arrived at Casablanca, French Morocco, in company with Reynolds Weaver and others and joined Bud Yost—a little later Kirk Keegan, Carl Fritts and Oscar Gunderson same along. Kirk, Bud and Oscar are associated together but I'm not sure where Carl is located now — he was in Constantine for awhile. . . .

". . . I left Casablanca last August and flew to Algiers on detached service with Hdqrs. 5th Army where I joined Frank Kreml. The two of us were together in 5th Army until I returned to Base Section last October. We came into Italy over the beaches during the first days of the invasion—the next few weeks were really hectic—I lost about 25 pounds and Frank that much or more. I've gained most of mine back now, however. While we were enroute to Italy we met George Barton and Bob Forester in Oran —George has since come over and relieved Frank. George and I collaborate very closely and see each other about once a week. He was down yesterday for a traffic meeting and stayed with us for dinner.

"I'm receiving TRAFFIC ENGINEERING regularly now and read each copy with great interest. Reynolds and I were both sorry to have missed the last I.T.E. convention—from all accounts it was an interesting meeting."

Lawrence Waterbury (Mem.) has just returned to New York after spending some time in Texas, consulting with the Texas Highway Department regarding routing of the Interregional Highways through Dallas and Fort Worth.

Richard W. Wilkinson

Word has been received of the death of Richard Wilkinson, Junior member of the Institute of Traffic Engineers. Since 1941 he had been with the Toronto Transportation Commission, Toronto, Canada. Mr. Wilkinson passed away after several months illness.

LOOKING AHEAD

INSTITUTE OF TRAFFIC ENGINEERS Board of Direction Meeting, June 25th in morning, Chicago, Illinois, tentatively scheduled for Sherman Hotel.

NEW ENGLAND TRAFFIC ENGINEERING CONFERENCE, July 13 and 14, Massachusetts Institute of Technology, Boston, Massachusetts.

INTERNATIONAL ASSOCIATION OF CHIEFS OF POLICE, 51st Annual and 3rd War Conference, Hotel Statler, Cleveland, Ohio, Aug. 14, 15, and 16.

INSTITUTE OF TRAFFIC ENGINEERS Annual Meeting, Chicago, October 1, 2, 3, and 4.

Traffic Problems Solved with TRAFICOUNTERS *in Detroit*

"The city of Detroit Traffic Engineering Bureau uses a battery of 12 counters on a daily schedule," says Lloyd B. Reid, City Traffic Engineer.

"These counters are proving extremely useful in obtaining traffic counts at carefully selected locations on a regular schedule so as to determine monthly trends in traffic volumes. Traficounters are also used to determine the need for parking prohibitions and the hours when such need exists and to determine traffic volumes related to establishment of one way streets or through streets.

"Traficounters have proven themselves extremely valuable as a man-power saver. They permit 24 hour continuous counts without the need of an attendant. Detroit recently added 10 Traficounters to its supply."

Write for Bulletin on Streeter-Amet Traficounter.

STREETER-AMET COMPANY
4105 RAVENSWOOD AVENUE
CHICAGO 13, ILLINOIS

Traficounter

UPON REFLECTION!

To The Readers of Traffic Engineering

Getting Back to Fundamentals is apparently fundamental to members of the traffic engineering profession—and it is a profession of the "highest order" as other engineers have come to learn, when saddled with the building of safe and expeditious traffic operational principles into *proposed* or existing public ways.

The April editorial created comments throughout the traffic field and published below are representative samples, which the editor hopes will stimulate serious reflection on the problem of street and highway traffic which is essentially the *business* of conveying people and goods.

Traffic engineers, it seems, do not propose conjuring into being an "*Autopia*" where daily existence begins in "Trailer Gardens" or "Auto Arboretum" with homo sapiens travelling to work in and eating his lunch, banking his savings and seeing his movies from his car. No!, it appears that the traffic engineering profession does not advocate an "*Autopia*" with a clover leaf for every block, nor a pinnacled troglodytic Utopia of steel and stone populated with moving corpses in the flesh.

The traffic engineer is not visionary—he has vision. He values the economics of the problem while seeing the modern metropolis as the organic evolution of a number of cultural, living, recreational and working units articulated with economically efficient local transportation.

He recognizes the basic neighborhood unit function of the city and strives to understand the imperfections of man's building and to remedy them through building into the planning and design of the circulatory system the traffic principles which will aid best the proper functioning of the neighborhood units within which man works, plays, lives and has some use for his built-in walking apparatus which is also not an altogether worthless function.

THE EDITOR.

Following are comments received from various readers regarding the April editorial.

Remedial and Preventive

In the recent editorial entitled "Getting Back to Fundamentals," Leslie Williams has very properly pointed out the accomplishments which Traffic Engineers have been able to turn in by the skilled application of traffic engineering knowledge. These accomplishments, he further points out, have cost the public insignificant sums in view of the traffic relief which has been gained. He charges that the public has supported the Traffic Engineer in this measly, piece-meal procedure but I know of many Traffic Engineers who would question this statement with considerable feeling. Nevertheless, we can honestly say that we have turned in a good job in view of the relatively small costs involved.

The "fox-hole" approach must continue to be applied in gaining greater traffic efficiency from existing streets but such regulatory measures with their restrictive implications do not and cannot solve the traffic problem in its entirety. Existing streets and highways must be complemented, not only by the use of regulatory measures, but also by the creation of additional facilities and the undertaking of constructive measures. This latter part of the job is costly but it is of the stuff which seems to challenge the public imagination and which gains considerable support in some quarters.

Let us say then, that sound traffic engineering requires the use of each ingredient in proper proportion. It is the timely, scientific blending of regulatory measures with constructive measures which is required. It is sub-

PRISMO LIFELINE

DANGER —

...use PRISMO

▽

THE PRISMO SAFETY CORPORATION

HUNTINGDON · · · · · · · PENNSYLVANIA

mitted that this process calls for engineering skills of the highest order.

Theodore M. Matson (Mem.), Director, Yale Bureau for Street Traffic Research, Yale University, New Haven, Connecticut.

Faster Men Working

Men in the Armed Services, men in war production, men assisting traffic and transportation at home and abroad have a new understanding of the word *expedite*. Now we know how much faster an objective may be attained. Speed-up of individual effort is more important than ever before. Ingenuity, engineering, precision planning, coordinated action are some of the factors in the speeding up of successful accomplishment. Men are working faster because public welfare depends on doing a big war job quickly.

Traffic problems have been recognized, anticipated, and analyzed. Technical skill has developed thoroughly practical methods for improvement of traffic situations and the evaluation of benefits. Benefit evaluation is the basis for the traffic engineer's knowledge as to what is the first thing that must come first. It is the basis on which proper balance is established between the time and money to be invested in any two or more improvement methods.

Maximum public benefit per dollar cost has always been a primary objective of the traffic engineer—always will be. The people have made a tremendous investment in transportation. They have purchased motor vehicles. They have built streets and highways. They have paid for public transit facilities. The value of this investment depends upon how efficiently, how conveniently, how comfortably and how safely they can use this transportation investment to take them where they wish to go night as well as day.

Public realization of the benefit of traffic engineering means an ever increasing public demand for traffic engineering in the planning of *all* future improvements in our street and highway transportation system. First and foremost, they want those improvements made which will enable them to obtain greater overall benefit from their transportation investment and increase the value of what we have through traffic engineering.

Vision is necessary in the development of any nation, industry, or profession. Foresight, on the part of the founders and officers of the Institute of Traffic Engineers, has helped the members develop the national importance of the profession which this organization represents.

You are concerned with the future —not the past.

But little foresight is required to realize that from now on you will be working faster. Expedite the further development of scientific principles and rational plans, for the improvement of the general public welfare. Harness imagination with fact. Insist upon equitably balanced modernization and construction programs for more beneficial operation of future motor vehicle traffic.

Who has more right to maximum traffic benefit per dollar than the people?

Who knows more about traffic than traffic engineers?

Charles H. Rex (Mem.), Lighting Engineering Department, General Electric Company, River Works, Lynn, Massachusetts.

Transportation—A Fundamental

I have read your statement under "Frankly Speaking" in TRAFFIC ENGINEERING of April. I want to state that I am congratulating you on the quality of your statement of "Getting Back to Fundamentals." The problem of cities is primarily a problem of transportation and I think should be studied from this broad standpoint. I think we have a number of traffic engineers that have had their perspective warped by the automobile.

GEORGE H. HERROLD,
Planning Engineer, City Planning Board, St. Paul, Minnesota.

PLAN TODAY
To Use GROTELITE
PLASTIC REFLECTORS ON TOMORROW'S HIGHWAYS

These sturdy roadside delineators are equipped with the new Grotelite plastic reflector.

They are prismatic type; front face is smooth.

High intensity reflection at long range. Extreme angularity without loss of reflecting power. They remain visible almost up to the point of passing by the vehicle. Housings are of rugged construction, durably finished.

BE SURE TO SPECIFY GROTELITE PLASTIC REFLECTORS FOR ECONOMY

The Grotelite Co., Inc.
Bellevue, Kentucky

NEWS FROM HERE AND THERE

DRIVER EDUCATION: The U. S. Army Corps of Engineers has just issued a 72-page booklet, "Standard Procedure for Examining, Testing and Selective Training of Motor Vehicle Drivers," which was prepared by Amos E. Neyhart, consultant on Road Training, American Automobile Association, Washington, D. C. This pamphlet is being widely distributed to District and Safety Engineers of the U. S. Army Corps of Engineers throughout the country.

THE WINNERS: Winners of the American Automobile Association's Fifth National Pedestrian Protection Contest have been announced as follows:

States: First place ..... Wisconsin

Cities: First place

Over 500,000 Pop.—Chicago

100,000-500,000—Tie, Wichita and Cincinnati

50,000-100,000—Arlington, Virginia

25,000- 50,000—Tie, Rock Island, Illinois; High Point, North Carolina; and Lynchburg, Virginia

10,000- 25,000—Aberdeen, South Dakota

Under 10,000—Wood River, Illinois

O. D. T.: The divisions of Motor Transport and Local Transport have been consolidated under the new Highway Transport Department, which will be under the direction of Guy A. Richardson. This is divided into five divisions, Property Operations, Passenger Operations, Equipment and Research, Management, and Regional.

THREE NEW TRANSPORTATION AGENCIES?

After nearly three years of study, the two-man Board of Investigation and Research established under the Transportation Act of 1940, filed its preliminary report this week. The report is of interest to the transit industry especially because it proposes superimposing three new Government agencies upon the existing Federal regulatory groups now functioning, in order to create a new approach to regulation of transportation based on "cost and service rendered."

Severe criticism of the form that regulation of transportation has taken and also of the type of thinking that has developed in this field, marked the arguments presented. Three objectives were listed as the "basic requirements" for an efficient transportation system, as follows:

1. Provision of opportunity and encouragement for each agency to operate with the greatest possible economy and efficiency in the field where it can best serve the public.
2. Establishment of rates and charges which are related to the cost of providing the services rendered by each type of common carrier.
3. Abolition of all injurious discriminations in rates and services.

The board held that such objectives could be attained only by changes in governmental regulatory and administrative policy and by means of its recommended research, planning and promotional machinery.

This machinery was sketched also in three parts, as follows:

Federal Transportation Authority — An independent agency, or a bureau within the Department of Commerce, to study continuously the country's transportation needs and submit reports and recommendations to the President and Congress.

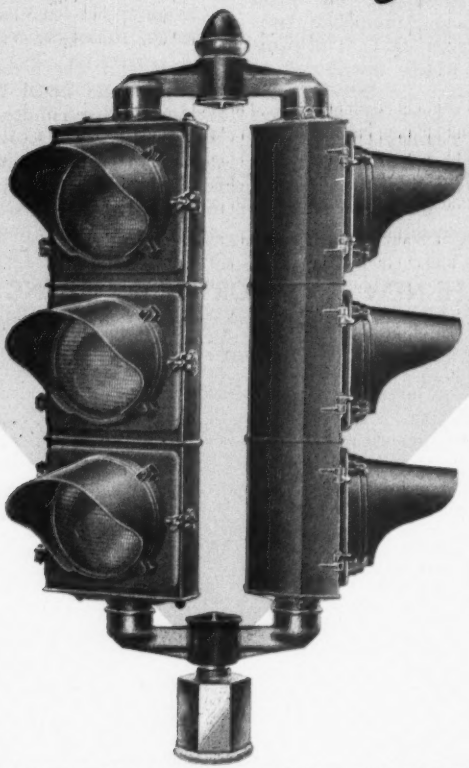
Office of Public Transportation Council —An agency of the Department of Justice to represent the public in all proceedings before transportation regulatory bodies.

National Transportation Advisory Council—A group representing transportation, finance, agriculture, labor, industry and public service, with members to be named by the President and confirmed by the Senate, which would "meet with, advise and criticize the other transportation bodies" and report on their activities to the President and Congress.

Opinion in Washington has it that "if and when" the Board's recommendations are accepted, the principles involved will be applied to the transition period following the conclusion of the war.

MARBELITE

Better Built Signals



YOU can determine by just looking at this advanced design of a Two Way, Three-Color adjustable Signal that it is BETTER-BUILT.

Note the reinforced aluminum mounting brackets that replace the conventional pipe and fitting assembly. A compact, sturdy arrangement, eliminating small, minor parts.

You bet! It is BETTER-BUILT quality.

That isn't all, but it gives an idea of why Marbelite Signals are approved by numerous State and City Traffic Departments as well as Traffic Associations, and why there are so many thousands of Marbelite Signals in use in these Cities and States.

Familiarize yourself with other Marbelite features, such as the unbeatable optical unit. You will be proud to have such fine quality Signals regulating traffic in your community.

THE MARBELITE COMPANY, INC.

26 WARREN STREET **NEW YORK 7, N. Y.**